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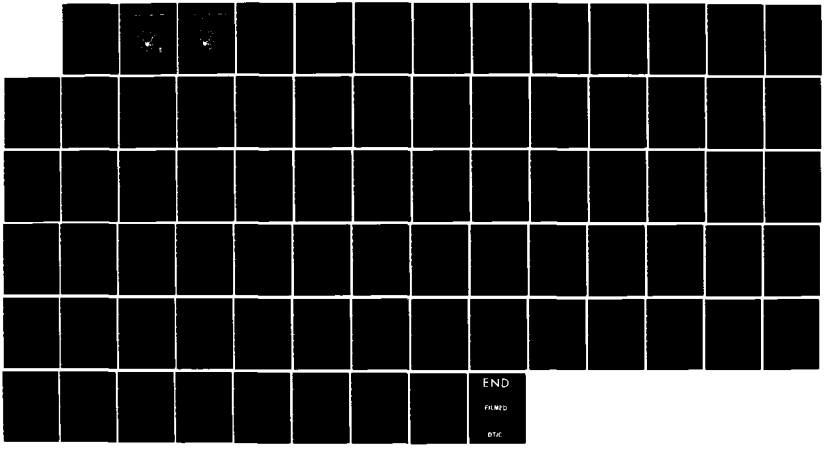

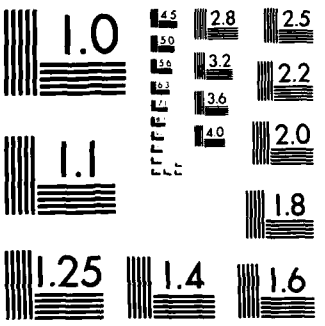

NAVAL SEA SYSTEMS COMMAND

LOGISTIC SUPPORT ANALYSIS

IMPLEMENTATION PROCEDURES

FINAL REPORT NO. CMLD-CR-16-85

CONTRACT NO. N00167-84-D-0039

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This report documents Logistic Support Analysis (LSA) implementation procedures and tailoring guidance for unique requirements of the System/Equipment Acquisition Program Manager, the Ship Acquisition Program Manager, and the System Program Manager within NAVSEA. It is to be used as a guideline for interpreting and implementing MIL-STD-1388-1A and MIL-STD-1388-2A for each NAVSEA ship, weapon system, and equipment acquisition. It provides step-by-step procedures to select appropriate LSA tasks and products, prepare LSA contractual documents, review the LSA program, and properly use LSA products. It also

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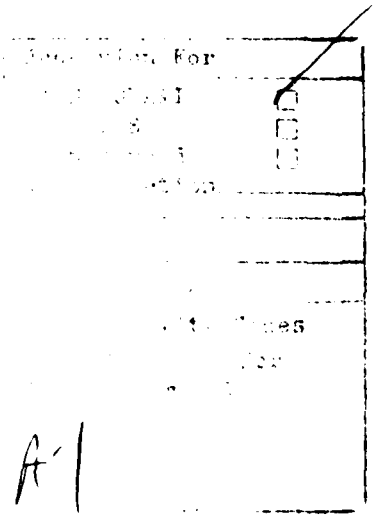
provides instructions for integrating the LSA program with related programs such as reliability and maintainability.



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NAVAL SEA SYSTEMS COMMAND
LOGISTIC SUPPORT ANALYSIS
IMPLEMENTATION PROCEDURES

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LSA IMPLEMENTATION PROCEDURES

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CHAPTER 1

INTRODUCTION

Purpose.

The purpose of this document is to assist ILS managers in planning and managing an LSA program. It is to be used as a guideline for interpreting and implementing MIL-STD-1388-1A and MIL-STD-1388-2A for each NAVSEA ship, weapon system, and equipment acquisition. This document does not describe how to perform specific LSA tasks. It does provide step-by-step procedures to select appropriate LSA tasks and products, prepare LSA contractual documents, review the LSA program, and properly use LSA products. It also provides instructions for integrating the LSA program with related programs such as reliability and maintainability.

Background.

Acquiring adequate and timely logistic support has long been a problem for the military services. MIL-STD-1388-1A, Logistic Support Analysis, was developed to provide an analytical process for developing logistic support in concert with weapon system design. MIL-STD-1388-2A, DoD Requirements for a Logistic Support Analysis Record, provides a method for recording data generated during the LSA process. These two standards are used by all the military services for all types of acquisition programs. In reality, only parts of these standards are applicable to a given NAVSEA acquisition. Additionally, NAVSEA has been performing many of the functions prescribed by MIL-STD-1388-1A under other programs. Consequently, the ILS manager's job of complying with MIL-STD-1388-1A and MIL-STD-1388-2A becomes very complex. Thus, there is a need for a guide to aid ILS managers in determining which LSA tasks are applicable to their particular program(s). This document provides that assistance.

LSA Objectives.

LSA has four objectives: (1) to influence the design of a system to make it supportable; (2) to determine total resources

required to support the system; (3) to control the logistic analytical effort; and (4) prepare data products. LSA is the integrator between hardware design and the logistic support system design.

LSA Tasks.

A total of fifteen tasks and seventy-seven subtasks are prescribed by MIL-STD-1388-1A. They are divided into five functional groups. The LSA tasks are:

Task Section 100 Program Planning and Control

- Task 101 Development of an Early Logistic Support Analysis Strategy
  - 101.2.1 - LSA Strategy
  - 101.2.2 - Updates
- Task 102 Logistic Support Analysis Plan
  - 102.2.1 - LSA Plan
  - 102.2.2 - Updates
- Task 103 Program and Design Reviews
  - 103.2.1 - Establish Review Procedures
  - 103.2.2 - Design Reviews
  - 103.2.3 - Program Reveiws
  - 103.2.4 - LSA Review

Task Section 200 Mission and Support Systems Definition

- Task 201 Use Study
  - 201.2.1 - Supportability Factors
  - 201.2.2 - Quantitative Factors
  - 201.2.3 - Field Visits
  - 201.2.4 - Use Study Report and Updates
- Task 202 Mission Hardware, Software, and Support System Standardization
  - 202.2.1 - Supportability Constraints
  - 202.2.2 - Supportability Characteristics
  - 202.2.3 - Recommended Approaches
  - 202.2.4 - Risks
- Task 203 Comparative Analysis
  - 203.2.1 - Identify Comparative Systems
  - 203.2.2 - Baseline Comparision System
  - 203.2.3 - Comparative System Characteristics
  - 203.2.4 - Qualitative Supportability Problems
  - 203.2.5 - Supportability, Cost, and Readiness Drivers
  - 203.2.6 - Unique System Drivers
  - 203.2.7 - Updates
  - 203.2.8 - Risks and Assumptions

Task 204 Technological Opportunities
- 204.2.1 - Recommended Design Objectives
- 204.2.2 - Updates
- 204.2.3 - Risks

Task 205 Supportability and Supportability Related Design Factors
- 205.2.1 - Supportability Characteristics
- 205.2.2 - Supportability Objectives and Associated Risks
- 205.2.3 - Specification Requirements
- 205.2.4 - NATO Constraints
- 205.2.5 - Supportability Goals and Thresholds

Task Section 300 Preparation and Evaluation of Alternatives

Task 301 Functional Requirements Identification
- 301.2.1 - Functional Requirements
- 301.2.2 - Unique Functional Requirements
- 301.2.3 - Risks
- 301.2.4 - Operations and Maintenance Tasks
- 301.2.5 - Design Alternatives
- 301.2.6 - Updates

Task 302 Support System Alternatives
- 302.2.1 - Alternative Support Concepts
- 302.2.2 - Support Concept Updates
- 302.2.3 - Alternative Support Plans
- 302.2.4 - Support Plan Updates
- 302.2.5 - Risks

Task 303 Evaluation of Alternatives and Tradeoff Analysis
- 303.2.1 - Tradeoff Criteria
- 303.2.2 - Support System Tradeoffs
- 303.2.3 - System Tradeoffs
- 303.2.4 - Readiness Sensitivities
- 303.2.5 - Manpower and Personnel Tradeoffs
- 303.2.6 - Training Tradeoffs
- 303.2.7 - Repair Level Analyses
- 303.2.8 - Diagnostic Tradeoffs
- 303.2.9 - Comparative Evaluations
- 303.2.10 - Energy Tradeoffs
- 303.2.11 - Survivability Tradeoffs
- 303.2.12 - Transportability Tradeoffs

Task Section 400 Determination of Logistic Support Resource Requirements

Task 401 Task Analysis
- 401.2.1 - Task Analysis
- 401.2.2 - Analysis Documentation
- 401.2.3 - New/Critical Support Resources
- 401.2.4 - Training Requirements and Recommendations
- 401.2.5 - Design Improvements
- 401.2.6 - Management Plans

401.2.7 - Transportability Analysis
401.2.8 - Provisioning Requirements
401.2.9 - Validation
401.2.10 - ILS Output Products
401.2.11 - LSAR Updates

Task 402 Early Fielding Analysis
402.2.1 - New System Impact
402.2.2 - Sources of Manpower and Personnel Skills
402.2.3 - Impact of Resource Shortfalls
402.2.4 - Combat Resource Requirements
402.2.5 - Plans for Problem Resolution

Task 403 Post Production Support Analysis
403.2 - Post Production Support Plan

Task Section 500 Supportability Assessment

Task 501 Supportability Test, Evaluation, and Verification
501.2.1 - Test and Evaluation Strategy
501.2.2 - Objectives and Criteria
501.2.3 - Updates and Corrective Actions
501.2.4 - Supportability Assessment Plan (Post Deployment)
501.2.5 - Supportability Assessment (Post Deployment)

LSA Data Base.

The LSA data base is established at the initiation of the LSA program and contains all LSA documentation. LSA documentation includes all data resulting from analyses, including narrative reports, LSA Records (LSARs), and output reports. The data base can be automated or manual depending on the size and complexity of the program, access to automated data processing equipment, design stability, NAVSEA schedule requirements, and acquisition phase. The LSA data base is continually updated as additional data become available.

LSARs available for use are listed below. Not all records will be applicable to every NAVSEA ship or system/equipment acquisition.

LSAR A: Operation and Maintenance Requirements
LSAR B: Item Reliability and Maintainability Characteristics
LSAR B1: Failure Modes and Effects Analysis
LSAR B2: Criticality and Maintainability Analyses
LSAR C: Operation and Maintenance Task Summary
LSAR D: Operation and Maintenance Task Analysis

LSAR D1:	Personnel and Support Requirements
LSAR E:	Support Equipment and Training Material Description and Justification
LSAR E1:	Unit Under Test and Automatic Test Program(s)
LSAR F:	Facility Description and Justification
LSAR G:	Skill Evaluation and Justification
LSAR H:	Support Items Identification
LSAR H1:	Support Items Identification (Application Related)
LSAR J:	Transportability Engineering Characteristics

ole of the ILS Manager.

The ILS manager has overall responsibility for managing the ILS rogram for a specific ship or system/equipment acquisition under he direction of an acquisition manager or project manager. The ILS anager's primary objective is to ensure that the necessary logistic upport is acquired through the application of established ILS anagement procedures.

LSA is the technique used to bridge the gap between the design rocess and ILS. Therefore, management of the LSA program is an mportant aspect of ILS management. In regard to LSA, the ILS anager is responsible for planning the LSA program and monitoring he contractor's progress in meeting established LSA requirements. his includes establishing the criteria for review, approval, cceptance, release, and distribution of LSA data resulting from the ntegrated LSA process.

The LSA strategy is prepared by the ILS manager. The strategy rovides potential supportability objectives for the new ship or ystem/equipment. It also recommends LSA tasks and subtasks that ould provide maximum supportability impact on design. The ontractor who will be performing the LSA submits an LSA plan to AVSEA that proposes the organization, methodology, and schedule for he LSA program. The ILS manager is responsible for reviewing the SA plan to ensure it meets the requirements of NAVSEA.

The ILS manager maintains a constant interface with the support ommunity throughout the acquisition process. The importance of his interface increases when the effort becomes labor intensive and

inning, and major subsystems. The ship's mission, operational onstraints, plan for use, and maintenance, supply support, and inning concepts are updated.

- Preliminary Design: The objective of this phase is to oduce the functional baseline of the ship. Once this is known, stems/equipments requiring development can be initiated. These ems will follow the system/equipment acquisition process.

- Contract Design: During this phase, the functional baseline ocuments that were developed during the preliminary design are anslated into ship specifications and other contractual ocumentation. The purpose is to provide a suitable solicitation ackage to contract for the detail design and construction of the ead ship. Also, the contractual ILS requirements for the hipbuilder and Naval participating managers and activities are efined. GFE/CFE is specified in the ship specification. If an xisting ILS package exists for these items, it may be necessary to odify it for the ship application.

- Detail Design and Lead Ship Construction/Follow Ship onstruction: This phase includes the detail design of the ship and ts installed systems and the construction of the ship. The hipbuilder completes the design of those aspects of the ship that equire construction first and then progressively completes the esign and construction of the ship. The Fitting Out Management nformation System (FOMIS) provides the means to define accurately he ship configuration by providing a centralized bank of data for eporting status information to activities responsible for managing nd supporting the construction and fitting out effort, and provide n accurate and complete equipment configuration baseline for each hip as delivered. Ship and shore logistic resources are acquired o maintain and support the ship for its life cycle. The follow hip construction phase begins with the award of the production ontract. During this phase, emphasis is placed on producing and esting the new class of ships and incorporating into the

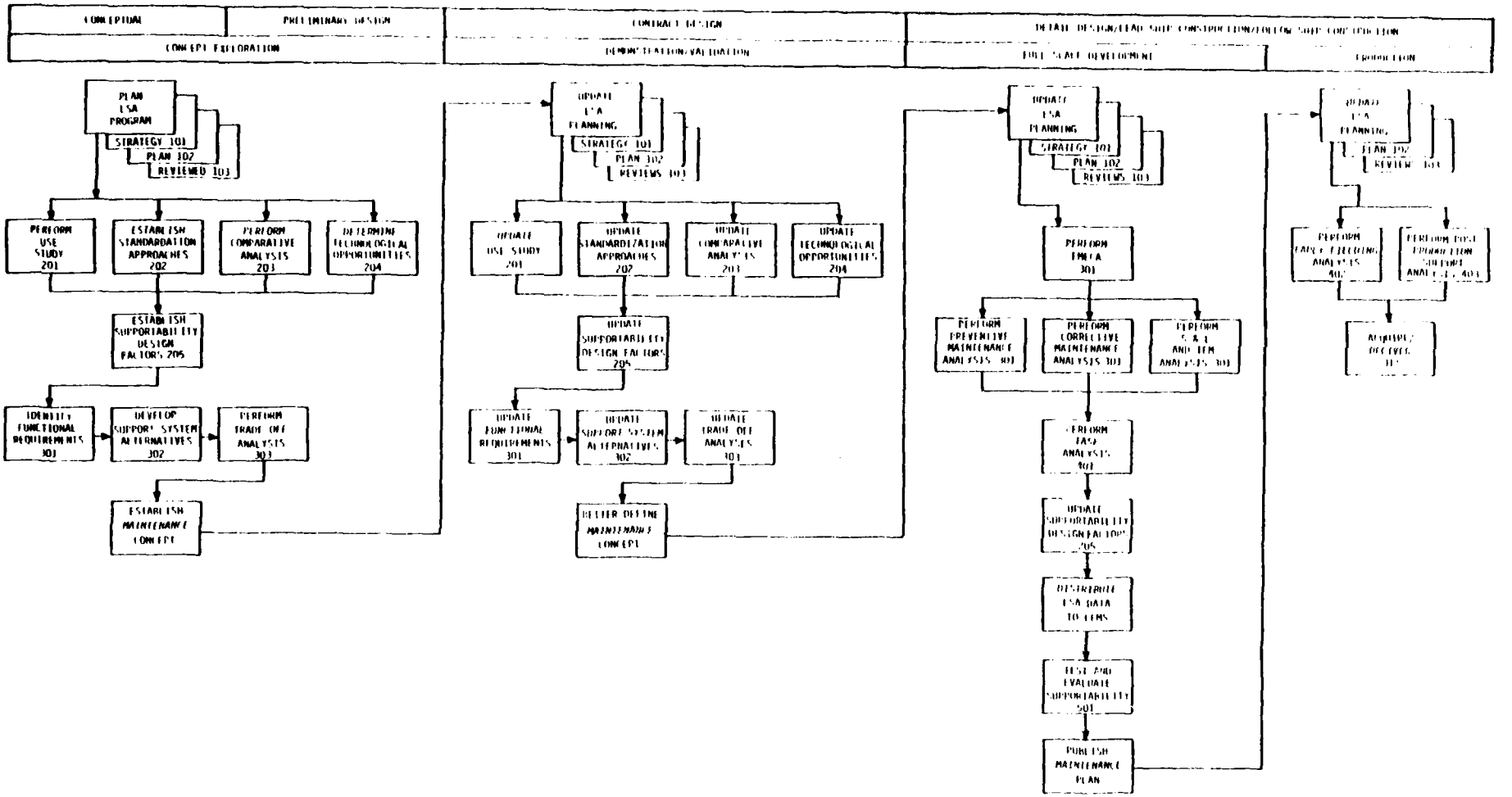

FIGURE 4. LSA LOGIC FOR SHIPS AND SYSTEMS /EQUIPMENTS

built. The cost is obviously prohibitive. However, the interplay between ship construction and final design offers some latitude for affecting ship design from a supportability viewpoint.

Even though the acquisition processes are different for ships and systems/equipments the LSA process remains essentially the same. This is because LSA is an analytical process. The steps remain the same regardless of what is being designed. Figure 4 illustrates the LSA tasks that take place during each ship and system/acquisition phase. In the early phases conceptual studies and trade-offs are performed. Similar systems are studied to determine potential problems to avoid and areas to be emulated. New technology is assessed to determine its applicability to the ship or system/equipment under development. Later, as design becomes fixed, operations and maintenance tasks are determined and the logistic support required for these tasks is acquired. The final product will be a ship or system/equipment designed to be supportable and the logistic support system capable of supporting the design. All of the tasks illustrated in Figure 4 may not be required for every acquisition program depending on the type of program and the tailoring process.

Ship Acquisition Process.

The initial requirements for a ship type and a concise statement of operational needs are defined through threat analyses and promulgated by OPNAV. These requirements form the basis for NAVMAT to initiate feasibility studies to define various alternative configuration baselines to satisfy the operational needs of the ship. Identification of mission, operational requirements, plan for use, manning limitations, maintenance and supply support concepts, and funding constraints are documented in program initiation documents. These program initiation documents provide the data for the initial LSAR A prepared by the ILS manager. Ship development then progresses through the following acquisition phases:

- Conceptual: During this phase a ship's technical and configuration baseline is defined. This includes weight, arrangements,

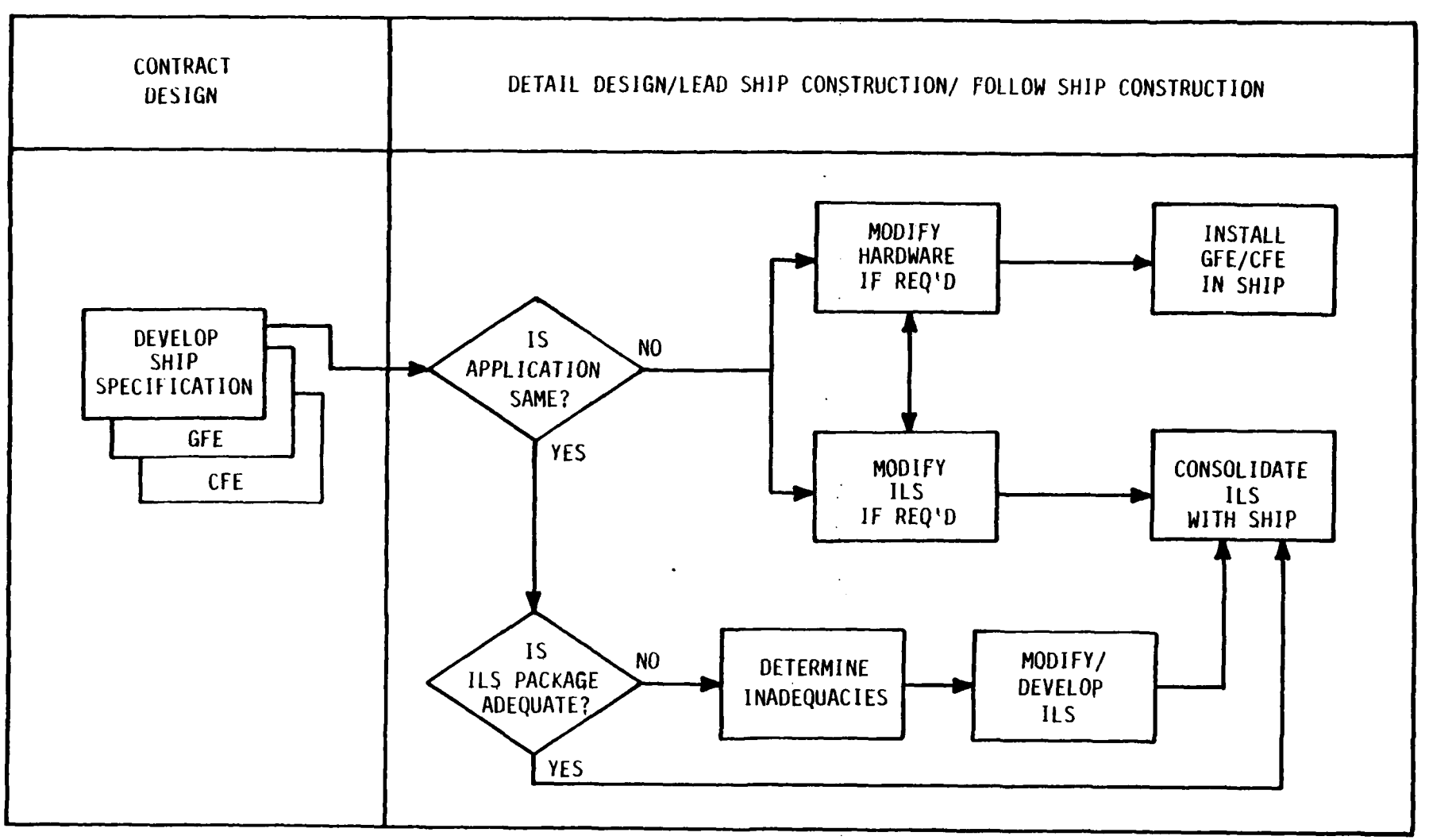

FIGURE 3. NON-DEVELOPMENTAL GOVERNMENT FURNISHED EQUIPMENT/ CONTRACTOR FURNISHED EQUIPMENT LSA LOGIC

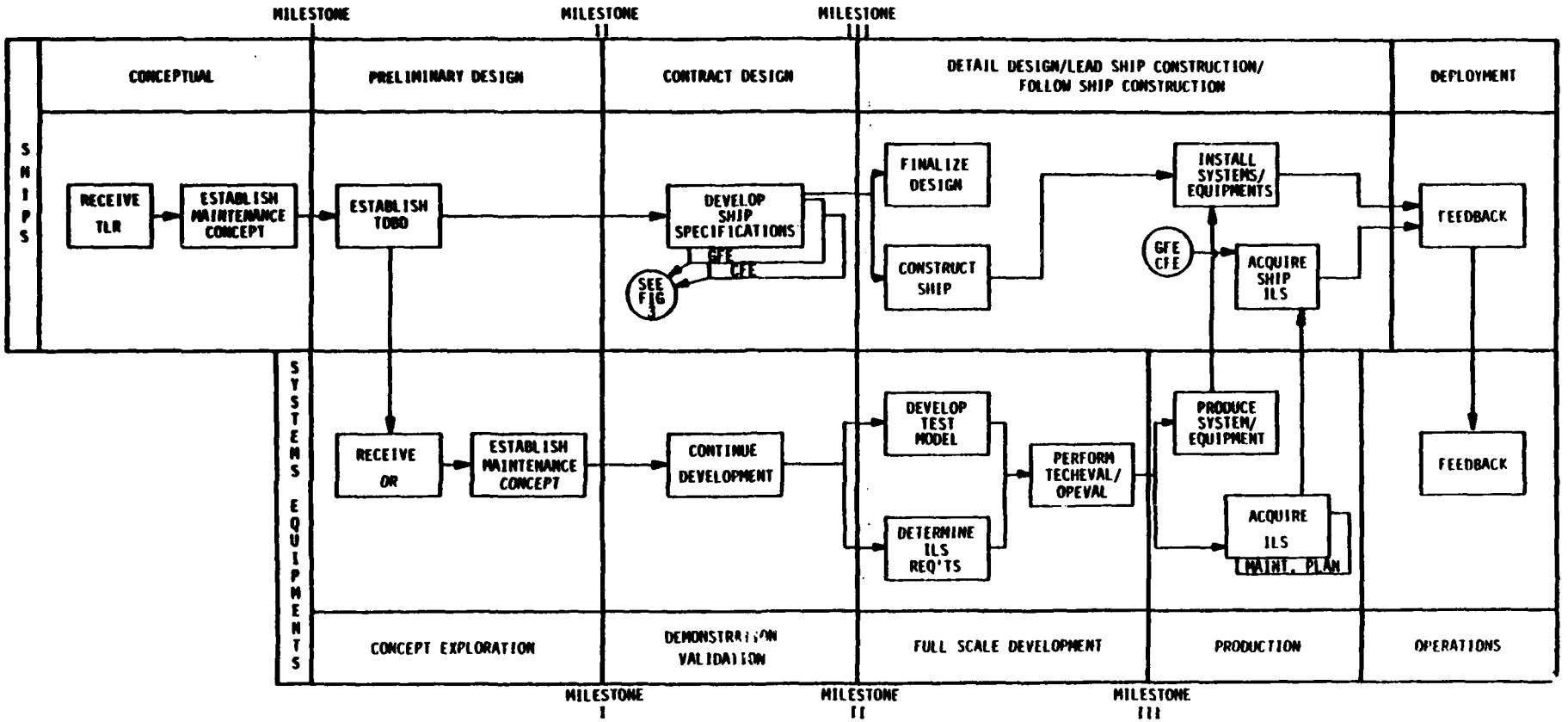

FIGURE 2. RELATIONSHIP BETWEEN SHIP AND SYSTEM/EQUIPMENT ACQUISITION PROCESS

LSA IMPLEMENTATION PROCEDURES

CHAPTER 3

TAILORING LSA

LSA For Ships and Systems/Equipments.

LSA must be understood in the context of the acquisition process. The acquisition process for ships is different from the acquisition process for systems/equipments. Figure 2 illustrates these differences and depicts where the two processes are interrelated. The following paragraphs discuss the interrelationships.

During the preliminary design phase of the ship acquisition process a top-down breakdown (TDBD) of the ship is developed. At this time the need for a new system/equipment can be determined. This need will be translated into an operational requirement (OR) that initiates the system/equipment acquisition process. The system/equipment, constrained by the ship maintenance concept, will progress through the system/equipment acquisition phases and be delivered to the shipyard for installation. The ILS products for the system/equipment will also be delivered at this time.

During the contract design phase of the ship acquisition process a ship specification will be developed. It will include specifications for Government furnished equipment (GFE) and contractor furnished equipment (CFE). GFE and CFE is often off-the-shelf equipment or is being developed for another application. Thus, the classical system/equipment acquisition process will not be followed. If the existing application of the GFE/CFE will be the same on the new ship, the ILS package must be assessed to determine if it is complete and adequate. If the hardware must be modified for ship application the ILS will also be modified. CFE often requires modifications prior to installation in the ship, such as sound mount installations. Figure 3 illustrates the steps to be taken when acquiring GFE/CFE.

Another difference between the ship and system/equipment acquisition process is that prototype ships for testing are not

Step 10: Distribute LSA Products to Logistic Element Managers.

Logistic element managers are responsible for developing ILS products to support the ship or system/equipment. Examples of these products include maintenance plans, technical manuals, initial provisioning, and training courses. It is the ILS manager's responsibility to ensure that the logistic element managers (a) receive only the data useful to them, and (b) receive the data in time to develop the required products. Chapter 5 of this handbook discusses each ILS element, its required LSA data, and products developed.

During the planning, initiating, and managing of the LSA program MIL-STD-1388-1A Task 101, Task 102, and Task 103 have been performed.

In addition to the LSA plan, the contractor will submit a plan that proposes LSA, program, and design reviews. The ILS manager will assess the adequacy of the plans. Refer to MIL-STD-1388-1A LSA Task 103 for additional guidance.

Step 7: Hold an LSA Guidance Conference.

An LSA guidance conference will be scheduled and conducted following contract award to ensure a thorough and complete understanding of LSA program requirements between NAVSEA and the contractor. At the conference the LSA plan will be reviewed. Additionally, the following items should be considered: clarification of schedules, verification of information flows, assignment of points of contact, establishment of sources of data, clarification of review policies, and establishment of review procedures.

Step 8: Establish LSA Review Team.

The LSA review team is comprised of the personnel who participate in the LSA, program, and design reviews. These will include the NAVSEA ILS manager, appropriate logistic element managers, acquisition personnel, and design and technical specialists. Team composition may vary according to the phase, program, and type of review. Both Government and contractor personnel are represented. It is the ILS manager's responsibility to select the team and notify its members about reviews. The LSA review team leader is a member of the ILS management team.

Step 9: Review LSA/LSAR.

The ILS manager will review the LSA and LSAR throughout the acquisition process and maintain the integrity of the LSAR for the life of the ship or system/equipment. Chapter 4 of this handbook provides a series of checklists to be used for (a) LSA reviews, (b) LSAR reviews, (c) program reviews, (d) design reviews, and (e) test and evaluations.

The contractor prepares an LSA plan as part of the proposal. It must address the items designated in MIL-STD-1388-1A Task 102, LSA Plan. Additionally, NAVSEA requires the following:

- The selection of items to undergo LSA will be based on a functional block diagram illustrating functional and hierarchical relationships. The highest indenture level is presented by a single block, indicating an entire ship. The ship's seven major functional groups comprise the first indenture level and are: hull structure, propulsion plant, electrical plant, command and surveillance, auxiliary, outfit and furnishings (general), and armament. Each group is progressively divided into more specific functions.
- The LSA control number (LCN) used by the contractor must be able to identify each item within the system undergoing LSA to the component and piece part levels. This number must also be related to a Functional Group Code (FGC) identification of the same system. The FGC is a functional hierarchical numbering system based on the Expanded Ship Work Breakdown Structure (ESWBS). Refer to NAVSEAINST 4790.1A and the Expanded Ship Work Breakdown Structure Manual for details of ESWBS and FGC. Also refer to MIL-STD-1388-2A, Appendix D, for an explanation of the four methods of assigning LCNs: classical, modified classical, vertical classical, and sequential.
- The ESWBS indenturing system will be used for the Failure Modes, Effects and Criticality Analysis, Reliability-Centered Maintenance Analysis, corrective maintenance analysis, inactive equipment maintenance analysis, servicing and lubrication analysis, Configuration Status Accounting, and for the Weapons Systems File.
- The contractor will propose a manual or automated LSAR system. The ILS manager will determine the feasibility of the choice based on complexity of the program, amount of data to be generated, and cost of system. If an automated system is selected the contractor must provide one that meets the requirements of MIL-STD-1388-2A or use the Government provided model. The DIDs for LSA output reports are applicable to either an automated or manual system.

LOGISTIC SUPPORT ANALYSIS
STATEMENT OF WORK

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1.1 Purpose
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1.3 Application
2.0 APPLICABLE DOCUMENTS
2.1 Guidance
2.2 Specifications
3.0 REQUIREMENTS
3.1 LSA Program Management
3.2 LSA Program Requirements
3.2.1 LSA Tasks
3.2.2 LSA Data Base
3.2.2.1 Design Information
3.2.2.2 LSAR
3.2.2.3 LSAR Access Requirements
3.2.2.4 LSA Data Delivery
3.3 LSA Candidate Selection
3.4 LSA Control Numbers
3.5 LSA Guidance Conference
4.0 DATA ITEM DESCRIPTION

FIGURE 1. SAMPLE OUTLINE

operating requirements and supportability objectives for the new system. Examples include annual operating days, number of operating locations, operational availability, and minimum and optimal mean time between failures. These data are found in program initiation documents and by comparisons to similiar systems, adjusted for differing uses. The LSAR A is updated before entering subsequent acquisition phases by using the results of LSA subtask 205.2.3. LSAR A is also included in the solicitation package. Instructions for preparation are contained in MIL-STD-1388-2A.

Step 5: Prepare Inputs to Solicitation Package.

The ILS manager will prepare the following items as input to the solicitation package:

- Statement of Work (SOW) documenting selected LSA tasks from Step 1. An outline of a SOW is provided in Figure 1 on the next page.
- Contract Data Requirements List (CDRL) specifying:
  - Data Item Descriptions (DIDs) for narrative reports (see worksheet in Chapter 3)
  - The LSAR DID (DI-L-7145) modified to reflect which LSARs are required (see worksheet in Chapter 3)
  - DIDs for LSA output reports (see page 3-17)
- LSAR Data Selection Sheet (DD Form 1949-1)
- Initial LSAR A for each system and identified subsystem for which maintenance requirements are to be imposed and for Government furnished equipment

Step 6: Review Contractor Responses to Solicitation Package.

Interested contractors will prepare responses to the solicitation package. In these responses the contractor will propose a method for performing the LSA. It is the ILS manager's responsibility to review these proposals and judge the adequacy of the contractor's LSA program.

performed under another program. For instance, a Failure Modes, Effects and Criticality Analysis should not be required if it is being performed under the Reliability and Maintainability program. Chapter 3 of this handbook discusses the major areas requiring integration with the LSA program.

Chapter 3 of this handbook also provides a series of YES/NO questions to assist the ILS manager in selecting appropriate LSA tasks. A worksheet is provided to record the selection of tasks.

This initial selection of LSA tasks will be included in the solicitation package released to competitive bidders. It is the framework upon which all subsequent LSA planning will be done.

The ILS manager, upon selection of the LSA tasks, has performed Task 101, Development of an Early Logistic Support Analysis Strategy. Refer to MIL-STD-1388-1A for additional guidance.

Step 2: Determine LSA Products.

The ILS manager must next determine the products generated by each LSA task. Products may be in the form of a narrative report, an LSAR, or an LSA output report. The LSA products form the baseline from which ILS products (e.g., technical publications, allowance lists, and training courses) will be developed. The worksheet in chapter 3 of this handbook specifies the products to require for the LSA tasks selected.

Step 3: Prepare LSAR Data Selection Sheet.

The LSAR Data Selection Sheet (DD Form 1949-1 Part I and Part II) specifies the data elements required to prepare the LSA products in Step 2, above. Part I contains data elements for all LSARs except H and H1, which are reflected in Part II. MIL-STD-1388-2A contains DD Form 1949-1 and the instructions for preparing it. The DD Form 1949-1 is included in the solicitation package.

Step 4: Prepare LSAR A.

The ILS manager will prepare an initial LSAR A for each system and identified subsystem for which maintenance requirements are to be imposed and for Government furnished equipment. It will include

LSA IMPLEMENTATION PROCEDURES

CHAPTER 2

PLANNING, INITIATING, AND MANAGING THE LSA PROGRAM

The following steps must be performed by the ILS manager during each acquisition phase or before a solicitation package is prepared for competitive bid.

Step 1: Determine LSA Tasks to be Performed.

The ILS manager's first action in planning the LSA program is to determine which LSA tasks to require. To require all of the LSA tasks specified in MIL-STD-1388-1A would not be cost effective. The selection of tasks is based on:

- Acquisition Phase: Conceptual studies are performed in the earlier acquisition phases when design can be changed. Analyses that determine actual operations and support tasks and the required logistic support are performed in the later acquisition phases.
- Type of Acquisition: Ship acquisitions require different LSA programs than systems/equipments because of the complexity of the ship acquisition process coupled with the requirement to integrate a multitude of independent systems/equipments. It follows that a state-of-the-art system/equipment will require a more comprehensive LSA program than an off-the-shelf item because of the likelihood of requiring new logistic resources. For many NAVSEA system/equipment acquisitions logistic support has previously been developed. It is the ILS manager's responsibility to determine if the existing support package can be used for the application at hand.
- Given Constraints: There may be certain factors pertaining to an acquisition program that place restrictions on the development process. These factors may include shortage of maintenance personnel, shortage of a specific skill, or funding limitations. An example is the LO-MIX concept used on some ship acquisitions.
- Analyses Performed Under Related Disciplines: An LSA program should not specify the performance of a task that is being

more coordination is required. This is especially true of the logistic element analyses that are performed during the full scale development acquisition phase. At this time, individual logistic element analysts determine detailed logistic support resource requirements for each logistic element based on the analytical data resident in the LSA data base. Effective coordination by the ILS manager minimizes duplication of effort and promotes cost-effective logistic support planning.

Organization of Document.

The remaining chapters of this document contain the following information:

Chapter 2: Specifies the steps to be taken by the ILS manager to plan, initiate, monitor, and distribute the products of the LSA program.

Chapter 3: Provides a series of YES/NO questions to assist the ILS manager in selecting the appropriate LSA tasks for a specific ship or system/equipment acquisition.

Chapter 4: Provides a series of checklists for reviewing the LSA program and the LSAR.

Chapter 5: Discusses how logistic element managers use the LSA data base to develop ILS products.

construction of the remaining ships the design changes resulting from production acceptance testing and from the first deployed ships' experiences. A Ship Class Maintenance Plan is developed.

System/Equipment Acquisition Process.

The need for a new system/equipment is identified by an operational requirement or Justification for Major System New Start (JMSNS). Supportability objectives for the new system/equipment are documented in program initiation documents that provide the ILS manager the information to prepare the initial LSAR A. The development process follows these acquisition phases:

- Concept Exploration: This phase is the initial LSA planning period used for establishing technical, support, and economic baselines. The desired outputs of this phase are alternative systems, including a preferred system, and corresponding operation and support parameters. The operation and support parameters will be constrained by the ship maintenance concept.
- Demonstration/Validation: The purpose of this phase is to transform the conceptual design into practical design criteria suitable for hardware development. Tradeoffs are conducted to determine support alternatives feasible for the system/equipment and to influence design from a supportability viewpoint.
- Full Scale Development: During this phase the system/equipment, including all of the items necessary for its logistic and operational support (e.g., training equipment, support equipment, technical manuals for operation and maintenance, etc.) is designed, fabricated, and tested. Operational evaluation (OPEVAL) and technical evaluation (TECHEVAL) are performed and approval for full production (AFP) is requested.
- Production: The beginning of the production phase is marked by the establishment of a product baseline. First article testing (FAT) is performed on the first production unit to ensure it has met contractual specifications and requirements. The production phase is characterized by the activation of operational sites and the

delivery and implementation of the support system. Continuing evaluation of the equipment, evaluation of data from the data collection system, initiation of a feedback system, and implementation of a corrective action program take place during this phase.

How To Determine LSA Tasks.

A series of YES/NO questions to be answered by the ILS manager begins on the next page. The answers to these questions will determine the LSA tasks (by MIL-STD-1388-1A subtask number) required for a particular ship or system/equipment acquisition program. They are based on what is already known about the program and how much has already been developed. The answers to these questions will determine the LSA tasks to be included in the Statement of Work.

QUESTIONS FOR TAILORING LSA TASKS

Instructions: This series of YES/NO questions is to be answered for a specific ship or system/equipment acquisition program to determine the required LSA tasks (by MIL-STD-1388-1A subtask number). Answer the entire series of questions for each acquisition phase. Tasks that are to be repeated will be indicated by an update task. Use the worksheet provided after the series of questions to document the selected LSA tasks and determine the product of the task.

1. Are the supportability factors related to the intended use known?

   YES — Document on LSAR A

   NO — Specify 201.2.1, 201.2.2, 201.2.3, 201.2.4

2. Can hardware, software, or logistic support system be standardized?

   YES — See questions 3, 4, and 5

   NO — Go to question 6

3. Can elements of the logistic support systems be standardized?

   YES — Specify 202.2.1

   NO — Disregard

4. Can hardware and software standardization programs (MIL-STD-680) or parts control programs (MIL-STD-965) be used?

   YES — Specify 202.2.2, 202.2.3 { Only if a separate contract item for standardization is not invoked. If a separate item is invoked, utilize the results of the analyses.

   NO — Disregard

5. Was the answer YES for 3 or 4?

   YES — Specify 202.2.4

   NO — Disregard

QUESTIONS FOR TAILORING LSA TASKS (continued)

6. Has the new system been compared to a similar (or identical) system?

YES	Specify 203.2.7 (go to question 10)
NO	Go to question 7

7. Can it be compared to another system?

YES	(to one or more systems) Specify 203.2.1
YES	(to components from many systems) Specify 203.2.2
NO	Specify 203.2.6

8. Were 203.2.1 or 203.2.2 specified?

YES	Specify 203.2.3 203.2.4 203.2.5 203.2.6 203.2.8
NO	Disregard

9. Has new technology (hardware or software) been assessed?

YES	Can it be used?	YES	Specify 204.2.2 204.2.3 Go to question 11
		NO	Disregard
NO	Go to question 10		

10. Can new technology (hardware or software) be used?

YES	Specify 204.2.1 204.2.3
NO	Disregard

11. Have any task section 200 tasks been selected?

YES	Specify 205.2.3
NO	Fill out LSAR A from program initiation documents or documentation on similar systems

QUESTIONS FOR TAILORING LSA TASKS (continued)

12. Is the support concept known and documented? (e.g., LAPL, technical manuals, training courses)

YES	Go to question 13
NO	Go to question 14

13. Is the application the same as that for the new system?

YES	Go to question 24		
NO	Will the hardware be modified?	YES	Go to question 14
		NO	Go to question 22

14. Have functional requirements and operations and maintenance task requirements been analyzed in a previous acquisition phase?

YES	Specify 301.2.6 (go to question 19)
NO	Go to question 15

15. Are all operations and support functions known?

YES	Use existing documentation
NO	Specify 301.2.1 301.2.2 301.2.3

16. Are there unknown corrective maintenance tasks?

YES	Specify 301.2.4.1 in accordance with NAVSEA FMECA requirements -or- Ensure FMECA is being done as part of R&M program. Document results on LSAR B, B1, and B2
NO	Use existing documentation to fill out LSAR B, B1, and B2

17. Will preventive maintenance be used?

YES	Ensure results of FMECA are available. Specify 301.2.4.2 in accordance with NAVSEA RCM requirements
NO	Disregard

QUESTIONS FOR TAILORING LSA TASKS (continued)

18. Will there be servicing and lubrication tasks or inactive equipment maintenance performed?

YES — Specify 301.2.4.3
Provide guidance on NAVSEA IEM and S&L procedures

NO — Disregard

19. If questions 14 or 15 or 16 or 17 or 18 were answered YES:

Specify 301.2.5
302.2.1 or 302.2.3
302.2.5

20. If questions 14 or 15 or 16 or 17 or 18 were answered YES:

Specify 303.2.1

-and-

Specify the trade-offs that will affect your program:

303.2.2	support system alternatives
303.2.3	design, operation, support concept trade-offs
303.2.4	readiness in relation to design and support concepts
303.2.5	manpower and personnel
303.2.6	training
303.2.7	level of repair (see SEA 9041 for LOR model)
303.2.8	diagnostic concepts
303.2.10	energy
303.2.11	survivability
303.2.12	transportability

21. If a subtask was specified from question 20:

Specify 302.2.2 or 302.2.4
302.2.5

22. If the answer to question 12 or 13 was NO or NO-NO:

Specify 401.2.1
401.2.3
401.2.4
401.2.5
401.2.6
401.2.7
401.2.8
401.2.10

QUESTIONS FOR TAILORING LSA TASKS (continued)

23. If the subtasks in question 22 have been specified before (in a previous acquisition phase or contract):

    Specify 401.2.11 instead

24. Will the support of the new ship or system/equipment adversely affect existing logistic support systems?

    YES Specify 402.2.1
                 402.2.2
                 402.2.3
                 402.2.4
                 402.2.5

    NO Disregard

25. Will closing of production lines affect the life cycle support?

    YES Specify 403.2

    NO Disregard

26. Will testing be performed?

    YES Specify 501.2.1
                 501.2.2
                 401.2.9
                 501.2.3

    NO Disregard

27. Are standard reporting systems inadequate to provide the required usage data?

    YES Specify 501.2.4

    NO Disregard

28. Will the contractor be analyzing usage data?

    YES Specify 501.2.5

    NO Disregard

LSA TASK SELECTION WORKSHEET

Instructions: This worksheet lists all LSA tasks specified by MIL-STD-1388-1A. Document the answers to the series of YES/NO questions provided on the preceding pages. Use this worksheet to develop the Statement of Work and Contract Data Requirements List. The mandatory YES subtasks were explained in Chapter 2 of this handbook. The mandatory NO subtasks are explained at the end of this worksheet.

LSA Subtask	YES	NO	Product/Comment	DID
101.2.1	X		Input to solicitation package Performed by ILS Manager	Not Applicable
101.2.2	X			
102.2.1	X		Part of contractor's response to solicitation	Plan Published IAW DI-L-7017A
102.2.2	X			
103.2.1	X		Part of contractor's response to solicitation	Part of LSA Plan *
103.2.2	X			
103.2.3	X			
103.2.4	X			
201.2.1			Compile in one narrative report	DI-S-7115
201.2.2				
201.2.3				
201.2.4				
202.2.1			Compile in one narrative report	DI-S-3606 **
202.2.2				
202.2.3				
202.2.4				
203.2.1			Compile in one narrative report	DI-S-7116
203.2.2				
203.2.3				
203.2.4				
203.2.5				
203.2.6				
203.2.7				
203.2.8				

* DI-A-7088 and DI-A-7089 required for each review
** May also require Parts Control Program DIDs if citing MIL-STD-965

LSA TASK SELECTION WORKSHEET (continued)

LSA Subtask	YES	NO	Product/Comment	DID
204.2.1			Compile in one narrative report	DI-S-7117
204.2.2				
204.2.3				
205.2.1		X		
205.2.2		X		
205.2.3			Narrative Report; LSAR A	DI-S-4057; DI-L-7145
205.2.4		X		
205.2.5		X		
301.2.1			Compile in one narrative report, include 301.2.5	DI-S-3606
301.2.2				
301.2.3				
301.2.4.1			LSAR B, B1, B2	DI-L-7145
301.2.4.2			LSAR B, B1, B2	DI-L-7145
301.2.4.3			LSAR C, D, D1,	DI-L-7145
301.2.5			See above	
301.2.6			Update LSAR B, B1, B2, C, D, D1	DI-L-7145
302.2.1			Compile in one narrative report	DI-S-3606
302.2.2				
302.2.3				
302.2.4				
302.2.5				
303.2.1			Separate narrative reports	DI-S-3606
303.2.2				
303.2.3				
303.2.4				
303.2.5				
303.2.6				
303.2.7				
303.2.8				
303.2.9		X		
303.2.10				
303.2.11				
303.2.12				
401.2.1			LSAR C, D, D1	DI-L-7145
401.2.2		X		
401.2.3			LSAR E, E1, F, G, J	DI-L-7145
401.2.4			LSAR D1, G	DI-L-7145
401.2.5			Narrative Report; LSAR D1, G	DI-S-3606; DI-L-7145
401.2.6			Narrative Report	DI-S-3606
401.2.7			LSAR J	DI-L-7145
401.2.8			LSAR H, H1	DI-L-7145

LSA TASK SELECTION WORKSHEET (continued)

LSA Subtask	YES	NO	Product/Comment	DID
401.2.9			Narrative report; also update existing LSAR	Consolidate with 501.2.3
401.2.10			Output summaries	Select DID*
401.2.11			Update existing LSAR	
402.2.1			Compile in one narrative report	DI-S-7118
402.2.2				
402.2.3				
402.2.4				
402.2.5				
403.2			Narrative Report	DI-P-7119
501.2.1			Narrative Report	DI-S-7120
501.2.2			Narrative Report	DI-S-7120
501.2.3			Narrative Report; also update exiting LSAR	DI-S-7121
501.2.4			Narrative Report	DI-S-7120
501.2.5			Narrative Report	DI-S-7121

* See list of DIDs on pages 3-17 and 3-18

Explanation of mandatory NO subtasks:

205.2.1, 205.2.2, 205.2.4, 205.2.5 — Performed in preceding 200 series tasks. Documented in 205.2.3

303.2.9 — Redundant to the comparative analysis of task 203

401.2.2 — Documentation of 401. Actually performed in subtasks of 401.

LSA OUTPUT REPORTS
DATA ITEM DESCRIPTIONS

Report Number	Report Title	Data Item Description Number
LSA-001	Direct Annual Maintenance Man-Hours Report	DI-L-7146
LSA-002	Personnel and Skill Summary Report	DI-L-7147
LSA-003	Maintenance Summary Report	DI-L-7148
LSA-005	Support Item Utilization Summary Report	DI-L-7149
LSA-006	Critical Maintenance Task Summary Report	DI-L-7150
LSA-007	Support Equipment Requirements	DI-L-7151
LSA-008	Support Items Validation Summary Report	DI-L-7152
LSA-009	Support Items List Report	DI-L-7153
LSA-010	Parts Standardization Summary Report	DI-L-7154
LSA-011	Requirements for Special Training Device Report	DI-L-7155
LSA-012	Requirements for Facility Report	DI-L-7156
LSA-013	Support Equipment Grouping Number Utilization Report	DI-L-7157
LSA-014	Training Task List Report	DI-L-7158
LSA-015	Sequential Task Description Report	DI-L-7159
LSA-018	Visibility and Management of Operating and Support Cost (VAMOSC) Summary	DI-L-7160
LSA-019	Maintenance Task Analysis Validation Summary Report	DI-L-7161
LSA-021	Task Referencing List Report	DI-L-7162
LSA-022	Referenced Task List Report	DI-L-7163
LSA-023	Maintenance Plan Summary Report	DI-L-7164
LSA-024	Maintenance Plan Report	DI-L-7165
LSA-025	Packaging Requirements Data Report	DI-L-7166
LSA-026	Packaging Developmental Data Report	DI-L-7167
LSA-027	Failure/Maintenance Rate Summary Report	DI-L-7168
LSA-028	Reference Number/Additional Reference Number Cross Reference List Report	DI-L-7169
LSA-032	Defense Logistics Services Center (DLSC) Submittals	DI-V-7016F
LSA-036	Provisioning Requirements	
	Recommended Repair Parts Lists (Preoperational)	DI-V-6180
	Consolidated Support Equipment List (CSEL)	DI-V-6183A
	Provisioning Parts List (PPL)	DI-V-7002A
	Short Form Provisioning Parts List (SFPPL)	DI-V-7003A
	Long Lead Time Items List (LLTIL)	DI-V-7004A
	Repairable Item List	DI-V-7005A
	Interim Support Items List	DI-V-7006A
	Tools and Test Equipment List (TTEL)	DI-V-7007A
	Common and Bulk Item List (CBIL)	DI-V-7008A
	Design Change Notices (DCN)	DI-V-7009A
	Post Conference List (PCL)	DI-V-7011A
	System Configuration Provisioning List (SCPL)	DI-V-7193

NOTE: Gaps in LSA output report number sequence is intentional. The LSA output report numbers grouped together out of sequence are incorporated in one DID (e.g., LSA-029, 030, and 031 are incorporated in DI-L-7188).

Report Number	Report Title	Data Item Description Number
LSA-040	Component of End Item (COEI) List Report	DI-L-7170
LSA-041	Basic Issue Items (BII) List Report	DI-L-7171
LSA-042	Additional Authorization List (AAL) Report	DI-L-7172
LSA-043	Expendable/Durable Supplies and Materials List (ESML) Report	DI-L-7173
LSA-050	Reliability-Centered Maintenance (RCM) Summary Report	DI-L-7174
LSA-051	Reliability Summary - Redesign Report	DI-L-7175
LSA-052	Criticality Analysis Summary Report	DI-L-7176
LSA-053	Maintainability Analysis Summary Level of Repair Report	DI-L-7177
LSA-054	Failure Mode Analysis Summary Report	DI-L-7178
LSA-055	Failure Mode Detection Summary Report	DI-L-7179
LSA-060	LSA Control Number Master File	DI-L-7180
LSA-061	Parts Master File	DI-L-7181
LSA-080	Bill of Materials Report	DI-L-7182
LSA-106	Reference Number Discrepency List Report	DI-L-7183
LSA-107	LCN-Task Identification Code Cross Reference List Report	DI-L-7184
LSA-108	Critical Data Changes	DI-L-7185
LSA-109	Unidentified Transactions	N/A
LSA-150	Provisioning Error List Report	DI-L-7186
LSA-151	Provisioning Parts List Index	DI-V-7192
LSA-152	PLISN Assignment/Reassignment Report	DI-L-7187
	Repair Parts and Special Tools List (RPSTL)	DI-L-7188
LSA-029	Repair Parts List	"
LSA-030	Special Tools List	"
LSA-031	Part Number/National Stock Number/Reference Designator Index	"
	Maintenance Allocation Chart (MAC)	DI-L-7189
LSA-004	Maintenance Allocation Summary	"
LSA-020	Tool and Test Equipment List	"
	Preliminary Maintenance Allocation Chart (PMAC)	DI-L-7190
LSA-016	Preliminary Maintenance Allocation Summary	"
LSA-017	Preliminary Maintenance Allocation Summary Tool Page	"
	LSAR File Maintenance and Audit Reports	DI-L-7191
LSA-100	Chronolog Information	"
LSA-101	Transaction Edit Results - Selection Cards	"
LSA-102	Transaction Edit Results - LCN Master	"
LSA-103	Transaction Edit Results - Parts Master	"
LSA-104	Transaction Edit Results - Narrative Master	"
LSA-105	Key Field Change Transactions	

NOTE: Gaps in LSA output report number sequence is intentional. The LSA output report numbers grouped together out of sequence are incorporated in one DID (e.g., LSA-029, 030, and 031 are incorporated in DI-L-7188).

nterfaces With Related Programs.

A primary objective of LSA is to reduce duplication of analyses nd documentation generated during the acquisition process. The LSA rogram must be the integrator of all analyses performed. It is the esponsibility of the ILS manager to ensure that the LSA program loes not specify analyses that are being performed under another rogram. It is also the responsibility of the ILS manager to ensure hat the results of the analyses performed under another program are vailable for the LSA process. Of particular concern are:

Subtask 301.2.4.1: This subtask specifies the use of data from he Failure Modes, Effects and Criticality Analysis (FMECA). It loes not specify the performance of the FMECA. Ensure that the MECA is being performed under the reliability and maintainability rogram. Also ensure that the FMECA is not priced under the LSA rogram.

Subtask 301.2.4.2: This subtask specifies the performance of a Reliability-Centered Maintenance (RCM) analysis. Do not repeat the RCM under the maintenance program if it will be performed under the LSA program. A FMECA must be performed before the RCM analysis. MIL-P-24534, Appendix F, requires that an RCM analysis be conducted on every system for which it has not been previously done, even if the system is already in use in the Navy.

Subtask 301.2.4.3: This subtask specifies the identification of operations and support tasks not identified by the FMECA or RCM. Specifically, NAVSEA requires servicing and lubrication (S&L) analyses and inactive equipment maintenance (IEM) analyses. Ensure that these analyses are not performed under the maintenance program and the LSA program.

Task 303.2.7: This subtask specifies a Level of Repair Analysis (LORA). Ensure that the LORA is not specified by both the LSA and maintenance programs.

Task 202: If a formal standardization program is established do not specify subtasks 202.2.2 and 202.2.3.

Task 501: Task 501 establishes the criteria for testing pportability. This testing is to be performed in conjunction with her testing such as Operational Evaluation (OPEVAL) and Technical aluation (TECHEVAL). Additionally, subtask 401.2.9 of the Task alysis requires validation of LSAR data by actual performance of erations and maintenance tasks. This should also be incorporated th other testing.

QUESTIONS FOR PROGRAM REVIEWS

Date:_____

Does the contractor have an ILS/LSA manager? Yes No NA

Are the following contractor functional
ements directly involved in the LSA process?

a. System maintenance requirements (LSAR A) Yes No NA

b. Reliability and maintainability engineering (LSAR B, B1 and B2) Yes No NA

c. Operations and maintenance tasks (LSAR C and D) Yes No NA

d. Publications (LSAR D) Yes No NA

e. Personnel and Training (LSAR D, D1 and G) Yes No NA

f. Support equipment (LSAR C, D and E) Yes No NA

g. Safety engineering (LSAR B, B1 and B2) Yes No NA

h. Test measurement and diagnostic equipment (LSAR E and E1) Yes No NA

i. Provisioning (LSAR H and H1) Yes No NA

Does the contractor have an approved list
LSA candidates/packages? Yes No NA

Can the contractor provide a status of his
A effort? Yes No NA

a. How many LSA candidates/packages? _____

b. How many completed to date? _____

c. When will the LSA effort be completed? Date:_____

d. What is the estimated number of parts that comprise the total system? _____

e. How many of the part-numbered items have a LSAR H initiated? _____

Does the contractor have formal procedures to
sure that the latest drawings and technical data
e being incorporated into the LSAR hard copy file? Yes No NA

2. If source, maintenance and recoverability (SM&R) codes are required, have they been entered on card H11 for each item? Yes No NA

3. Are SM&R codes consistent with the maintenance plan? The maintenance plan is documented in LSA output report 024. Yes No NA

4. Is LSAR H1 being used to determine initial support requirements? Yes No NA

LSAR J, Transportability Engineering Characteristics

1. LSAR J captures transportability engineering requirements for an end item. Has LSAR J been prepared for each end item in its shipping configuration? Yes No NA

2. In cases where the end item is to be sectionalized for transport, has LSAR J been completed for each section or critical subcomponent? Yes No NA

2. Has LSAR G been completed for each task on LSAR D1 where the Training Recommendation entry (D06, block 7i) indicates that additional training is required? Yes No NA

3. Does LSAR G reflect the minimum knowledge and skill levels required to perform each task? Yes No NA

LSAR H, Support Items Identification

1. LSAR H identifies supply support necessary for operation and maintenance of the system. Has a provisioning guidance conference been conducted or scheduled? Yes No NA

2. In accordance with contract requirements, does the contractor know to what indenture level LSAR H is to be completed? Yes No NA

3. Does the contractor understand that LSAR H is completed for each item that comprises a system (by reference number) to include reparable items, nonreparable items, bulk items, common hardware, and common/peculiar support equipment? Yes No NA

4. Does the contractor know the types of provisioning lists (e.g., PPL, LLIL, CBIL, SLPPL, etc.) that are required by the contract? Yes No NA

5. Is LSAR H being reviewed by system provisioners? Yes No NA

LSAR H1, Support Items Identification (Application Related)

1. LSAR H1 captures application data of items on LSAR H. Has LSAR H1 been prepared for each application of the item in a different next higher assembly? Yes No NA

3. Are all hardware and software elements required to conduct off-line tests identified, with appropriate justification? Yes No NA

I. LSAR E1, Unit Under Test and Automatic Program(s)

1. Has LSAR E1 been completed for each unit under test (UUT) that has a requirement to be tested by the support/test equipment documented on LSAR E? Yes No NA

2. Is the UUT that will be removed from the system identified? Yes No NA

3. Have those hardware and software elements required to test the UUT with off-line support/ test equipment been identified? Yes No NA

J. LSAR F, Facility Description and Justification

1. Has LSAR F been completed to identify and justify all proposed special or additional facility requirements indicated as a result of the maintenance task analysis (card C06 block 8A)? Yes No NA

2. Are facility designers utilizing the technical information contained in LSAR F to prepare facility plans? Yes No NA

K. LSAR G, Skill Evaluation and Justification

1. Has LSAR G been completed for each task on LSAR D1 where the Skill Specialty Evaluation Code entry (D06, block 7d) indicates that an existing skill must be modified or a new skill must be developed? Yes No NA

3. The item category code on the D07 card defines the type of item being listed (e.g., common tools, repair part, etc.). Has the entry been completed correctly? Yes No NA

4. Does the quantity-per-task block on the D07 card reflect the number of tools utilized and the number of repair parts consumed? Yes No NA

5. The personnel requirements entered on the D06 card should be based on the data from cards D02, D04, and D05.

   a. Has the skill level code (SLC) been entered? Yes No NA

   b. Has the SSC designation been correctly input? Yes No NA

   c. If the Skill Specialty Evaluation code is "M" or "E", has a LSAR G been completed for the SSC indicating the additional skill requirements? Yes No NA

   d. Has the total number of persons (for each SSC in block 7C) required to perform the task been entered? Yes No NA

6. Have the training recommendation and rationale blocks on card D06 been completed for each task from LSAR D? Yes No NA

H. <u>LSAR E, Support Equipment or Training Material Description and Justification</u>

1. Has LSAR E been completed for each "Y" answer on card C06 block 8B, identifying the need for new or modified training material? Yes No NA

2. Has LSAR E been completed for each "S, C, or B code" on card C06 block 8C, identifying the new or modified support/test equipment? Yes No NA

c. On the basis of available hardware or drawings, do the narrative steps flow in a logical manner (e.g., are the screws removed before the doorplate is removed, etc.)? Yes No NA

d. Has the contractor developed a standard method for identifying the tools and test equipment utilized in each step of the narrative? Yes No NA

e. Is the contractor properly employing his method of identifying tools in the narrative? Yes No NA

f. For tasks referenced in the narrative, can the contractor explain and show by example how the time is being accounted for? Yes No NA

6. Is the skill specialty code (SSC) entered for each task recorded on cards D04 and D05? Yes No NA

7. Are the applicable task times (mean man-minutes and mean minute elapsed time) entered for each SSC? Yes No NA

8. Are the narrative data and resource requirements contained on LSAR D and D1 being used to develop technical manuals and personnel requirements? Yes No NA

G. <u>LSAR D1, Personnel and Support Requirements</u>

1. On card D06, for each step in the narrative that consumes time, are the elapsed time and manhours completed? Yes No NA

2. Do the D06 cards contain all tools, test equipment, repair parts, and bulk items required to perform the maintenance task? Yes No NA

c. Has the measurement base been completed to reflect the measurement base of the annual operating requirements? Yes No NA

5. Does card C06, block 8 identify additional support requirements? Yes No NA

F. LSAR D, Operation and Maintenance Task Analysis

1. Does card D01 contain a brief narrative description of the maintenance task? Yes No NA

2. If the safety hazard severity code from the B13 and B16 cards is coded "2"--critical, or "1"--catastrophic, does the sequential task description (D02) contain warnings or cautions? Yes No NA

3. If the safety hazard severity code is "1" or "2", is the contractor attempting to redesign the item (indicated on the B12 card) in order to eliminate the safety hazard? Yes No NA

4. Does the safety hazard severity code agree with the logistic consideration for safety on the B06 card? Yes No NA

5. Card D02 captures the narrative description of the maintenance action to be performed. Has the project manager/contractor established a model narrative description that can be followed as a benchmark for all "D" records? Yes No NA

a. Does the narrative have a logical beginning and end (i.e., does it start with fault isolation and end with a test)? Yes No NA

b. If other tasks (such as fault isolations and tests) are referenced in the narrative, are the referenced tasks performed at the same level of maintenance? Yes No NA

QUESTIONS FOR LSAR REVIEWS (continued)

D. LSAR B2, Criticality and Maintainability Analysis

1. Does the failure mode criticality number block (card B16, block 12) identify what effect item failure has on the system/end item? Yes No NA

2. Have the failure rate and task time blocks been completed? Yes No NA

3. Are the results of the criticality and maintainability analyses that are documented on LSAR B2 based on the FMEA (from LSAR B1)? Yes No NA

4. Has LSAR B2 been completed to the same indenture level as LSAR B? Yes No NA

E. LSAR C, Operation and Maintenance Task Summary

LSAR C summarizes the detailed analysis information recorded on LSAR B, B2, and D. Therefore, the information should be compatible with the information on those LSARs.

1. Do cards C01 through C05 contain the same information that was input on cards B01 through B05? Yes No NA

2. Each C06 card summarizes the maintenance functions (e.g., repair, adjust, fault isolate, etc.) to be performed on the item identified by the C01 through C05 cards.

   a. Has the contractor identified all maintenance functions that should be performed? Yes No NA

   b. Do the maintenance functions agree with the maintenance concept on LSAR B? Yes No NA

3. Does the task interval (second character of the task code) agree with the task frequency? Yes No NA

4. The task frequency block identifies how many times per year a maintenance task is performed.

   a. Has a task frequency been input? Yes No NA

   b. Has the task frequency been calculated correctly? Yes No NA

information to identify properly the item under analysis (e.g., LCN, item name, etc.)? Yes No NA

3. Card B06 contains logistic considerations; have all the blocks been filled in? If any are marked "N" for not adequate, has an explanation been provided on the B12 card? Yes No NA

4. Are the contractor's reliability and maintainability engineering personnel completing LSAR B? Yes No NA

5. If Reliability-Centered Maintenance (RCM) has been contracted for, are the results of the RCM logic documented on the B11 card? Yes No NA

6. Does card B10 contain a detailed maintenance concept for the item under analysis (i.e., is the concept in line with current maintenance philosophy for the hardware)? Yes No NA

C. <u>LSAR B1, Failure Modes and Effects Analysis</u>

1. Card B13 captures the failure mode and effects analysis conducted by reliability engineering.

   a. Do the failure modes identify the way in which the item under analysis can fail (e.g., a resistor can fail "open" or it can short out)? Yes No NA

   b. Do the failure symptoms provide a means for identifying the failure mode and cause? Yes No NA

2. Has LSAR B1 been completed to the same indenture level as LSAR B? Yes No NA

3. Are failure effects data being used to develop fault location and trouble-shooting routines? Yes No NA

QUESTIONS FOR LSAR REVIEWS

Date: _____

1. Has the LSAR been validated during testing by using output report LSA-019, Maintenance Task Analysis Summary Report (DI-L-7161)?	Yes	No	NA
2. Has output report LSA-021, Task Referencing List Report (DI-L-7162), been used to eliminate duplication of effort in the documentation of tasks and task descriptions?	Yes	No	NA
3. Is output report LSA-022, Referenced Task List Report (DI-L-7163) available to cross reference those tasks that have been referenced by other tasks?	Yes	No	NA
4. Have all of the mandatory fields for LSAR input cards been completed as specified in Table I in MIL-STD-1388-2A (Appendix A)?	Yes	No	NA

A. <u>LSAR A, Operation and Maintenance Requirements</u>

1. Has NAVSEA provided LSAR A to the contractor?	Yes	No	NA
2. Has LSAR A been prepared for each system for which maintenance requirements are to be imposed?	Yes	No	NA
a. For each subsystem?	Yes	No	NA
b. For Government-furnished equipment (GFE)?	Yes	No	NA
3. Has LSAR A been updated as required by the contractor?	Yes	No	NA

B. <u>LSAR B, Item Reliability and Maintainability Characteristics</u>

1. Does card B08 contain a description of the function of each item?	Yes	No	NA
2. Do cards B01 through B03 contain enough			

20. If the contractor is developing or using another LSAR ADP program, has it been tested?	Yes	No	NA
21. If the contractor is developing or using another LSAR ADP program, does it meet the requirements of MIL-STD-1388-2A?	Yes	No	NA

QUESTIONS FOR LSA REVIEWS (continued)

a. Maintenance Planning	Yes	No	NA
b. Reliability	Yes	No	NA
c. Maintainability	Yes	No	NA
d. Publications	Yes	No	NA
e. Support and Test Equipment	Yes	No	NA
f. Provisioning	Yes	No	NA
g. Training	Yes	No	NA
h. Packaging, Handling, Storage, and Transportation	Yes	No	NA
i. ADP Personnel	Yes	No	NA
12. Are the LSA review procedures established in the contract being followed?	Yes	No	NA
13. Are LSA design influences/changes being documented?	Yes	No	NA
14. Has the following information been provided to the contractor as baseline data?			
a. List of currently available test equipment	Yes	No	NA
b. Common tool lists or tool sets	Yes	No	NA
c. Skills and their training program	Yes	No	NA
d. Envisioned operational unit	Yes	No	NA
e. Annual operating requirements or mission scenario	Yes	No	NA
15. Are engineering drawings available to the LSA analyst?	Yes	No	NA
16. Are engineering drawings available to the review team?	Yes	No	NA
17. Is prototype equipment available to the LSA analyst?	Yes	No	NA
18. Is hardware available to the review team?	Yes	No	NA
19. Has the Government furnished LSAR ADP program been provided to the contractor if requested?	Yes	No	NA

QUESTIONS FOR LSA REVIEWS

Date:_____

1. Are the analyses specified in the LSA Plan being performed? Yes No NA

2. Are all items on the approved LSA candidate list being analyzed? Yes No NA

3. How many LSA candidates are there? _____
(Note: An LSA candidate would, at a minimum, have a set of LSARs B, C, and D completed; this is sometimes called an LSA package).

4. How many LSA candidates/packages have been completed to date? _____

5. When will all LSA candidates/packages be completed per contract requirements? Date:_____

6. When will the current phase of the contract be completed? Date:_____

7. What is the estimated number of parts that will comprise the total system? _____

8. How many of the part-numbered items have a LSAR H initiated to date? _____

9. The LSA/LSAR is intended to provide source data for development of contract deliverable products. Responses to the following questions will indicate whether or not the LSA is actually being utilized to develop deliverable products. The date of delivery for each product should be after the date provided in question 5; otherwise, a possible conflict exists.

   a. Completion date of draft technical manuals _____
   b. Completion date of maintenance plan _____
   c. Delivery date of provisioning technical documentation _____

10. Does the contractor have identifiable LSA/LSAR officers? Yes No NA

11. Are the following areas represented on the contractor's LSA team?

LSA IMPLEMENTATION PROCEDURES

CHAPTER 4

REVIEWING LSA/LSAR

This chapter contains checklists to be used for:

- LSA Reviews
- LSAR Reviews
- Program Reviews
- Design Reviews
- Tests and Evaluations

QUESTION FOR PROGRAM REVIEWS (continued)

6. Has the prime contractor subcontracted any of the LSA/LSAR effort? If so, have review procedures been established?	Yes	No	NA
7. Has the contractor established formal quality control procedures for the LSAR?	Yes	No	NA

QUESTIONS FOR DESIGN REVIEWS

Date:_____

1. Are standardization recommendations resulting from subtasks 202.2.2 and 202.2.3 being incorporated into the design? These are documented in DI-S-3606.	Yes	No	NA
2. Are problems on similar systems being avoided in the design as indicated by subtask 203.2.4? These are documented in DI-S-7116.	Yes	No	NA
3. Are technological advancements recommended by subtask 204.2.1 being incorporated into the design? These are documented in DI-S-7117.	Yes	No	NA
4. Are recommendations to reduce or simplify functions from subtask 301.2.5 being incorporated into the design? These are documented in DI-S-3606.	Yes	No	NA
5. Are the results of trade-offs between design, operations, and support concepts specified by subtask 303.2.3 being incorporated into the design? These are documented in DI-S-3606.	Yes	No	NA
6. Are design modifications recommended in subtask 501.2.3 as a result of test and evaluations being incorporated? These are documented in DI-S-7121.	Yes	No	NA
7. Are the items proposed for redesign by output report LSA-051, Reliability Summary - Redesign Report (DI-L-7175) being analyzed?	Yes	No	NA
8. Are the items identified on output report LSA-052, Criticality Analysis Summary Report, being reviewed for possible redesign?	Yes	No	NA

QUESTIONS FOR TESTS AND EVALUATIONS

Date: _____

1. Are supportability test objectives included in the test and evaluation master plan? The objectives were established by performing subtasks 501.2.1 and 501.2.2 and were documented in DI-S-7120.	Yes	No	NA
2. Is output report LSA-019, Maintenance Task Analysis Validation Summary Report (DI-L-7161), available to verify support items and skill specialty requirements?	Yes	No	NA
3. Does the tested failure rate, failure mode ratio, and maintenance replacement rate correspond to output report LSA-027, Failure/Maintenance Rate Summary Report (DI-L-7168)?	Yes	No	NA
4. Does the tested mean time to repair correspond to the contractually specified number?	Yes	No	NA
5. Do the technical manuals provide adequate instructions to perform maintenance?	Yes	No	NA
6. Are the tools, support equipment, and spares and repair parts required for maintenance available and documented?	Yes	No	NA
7. Do the technical manuals provide adequate operation instructions?	Yes	No	NA
8. Can the designated skill specialty code perform the operations and maintenance?	Yes	No	NA

LSA IMPLEMENTATION PROCEDURES

CHAPTER 5

DISTRIBUTION OF LSA PRODUCTS TO LOGISTIC ELEMENT MANAGERS

The LSAR provides a central data base of information to develop ILS element documentation. It reduces duplication of analyses and provides accurate data so that all ILS element documents are developed from the same baseline. The logistic element managers (LEMs) will receive the LSA data through LSA output reports (if an automated system is used) or from the LSARs (if a manual system is used.) The ILS manager will be the focal point for distribution. The following paragraphs discuss the requirements of, and documents prepared by, each ILS element. These documents will be prepared for a particular ship or system/equipment only if specified in the solicitation package.

Maintenance Planning

LSARs: A, B, B1, B2, C, D, H, H1

Output Reports: 001, 003, 004, 005, 006, 015, 016, 017, 019, 020, 021, 022, 023, 024, 027, 050, 052, 053, 054, 055,

The maintenance plan is based on the results of the task analysis. It lists each maintenance action required and the maintenance level authorized to perform the maintenance.

Organizational level maintenance is considered to be the keystone of the system or equipment maintenance planning. The scope of maintenance that can be accomplished at the organizational level, and the desirability of accomplishing maintenance at that level tends to drive the maintenance requirements for the other levels. The desirability is based on mission constraints, manning levels, and economics. Organizational level maintenance will consist of planned maintenance system (PMS) and corrective/unscheduled maintenance. PMS consists of maintenance requirement cards, equipment guide lists, maintenance schedules, and maintenance index pages. Corrective/unscheduled maintenance is incorporated into the support system based on a realistic corrective/unscheduled workload definition, maintenance downtime, documentation requirements, repair parts, support and test equipment, and related support considerations.

Intermediate level maintenance must also be planned. Effective intermediate level maintenance can serve to reduce maintenance and logistic downtime, thereby increasing system availability. Additionally, it can reduce the maintenance burden at the organizational level. Intermediate maintenance activity (IMA) work centers must be assessed to determine their maintenance capabilities. The in-service engineering agent (ISEA) will validate the maintenance tasks assigned to the intermediate level.

Depot level maintenance requirements will also be assessed. Each depot level repairable (DLR) item will be assigned a designated overhaul point (DOP). Also, each new system or equipment must be evaluated as a potential depot "new start" candidate under intra/inter-servicing maintenance, allowing sufficient lead time for constructing any new facilities, order and delivery of support material, handling equipment, support and test equipment, training, and related requirements.

Direct fleet support (DFS) will provide technical assistance in the diagnosis and resolution of ship and maintenance problems that are beyond the capability of the ships force. Mobile technical units (MOTU) also provide technical support to organizational and intermediate maintenance levels.

Manpower and Personnel

LSARs: C, D, D1, G

Output Reports: 001, 002, 003, 004, 005, 006, 007, 008, 009, 010, 011, 012, 013, 014, 015, 019, 050, 051, 052, 053 054, 055

Due to increases in manpower costs and projected reductions in the size of the national labor pool, it is essential that manpower, personnel, and training requirements be assessed in terms of availability and affordability. (Training requirements are discussed later.) This assessment must begin early in the acquisition process and continue throughout the life cycle of the new system or equipment.

The Manpower, Personnel and Training Branch (SEA-05L1) is the central point of contact and source of manpower, personnel, and

training information within NAVSEA. SEA-05L1 provides guidance and assistance to all planners and developers in planning and executing manpower and personnel related responsibilities. Liaison between SEA-05L1 and planners/developers should be established early in the acquisition cycle.

During the conceptual phase, manning and personnel utilization shortcomings in comparative systems, personnel availability and utilization constraints on system supportability, and the range of solutions to manpower and personnel problems for DOPs are identified. Readiness and manpower/personnel cost targets for improvement are determined as part of the LSA process (Task 203). Also, the availability of personnel resource implications of alternative operational and support concepts is evaluated.

The capability of current and planned personnel to meet manpower objectives is validated during the demonstration/validation phase. Test and evaluation plans to assess the achievement of manpower and personnel related thresholds are developed. Manpower and personnel requirements for the preliminary ship manning document (PSMD) are provided. The PSMD displays the minimum billets required for assignment of ships personnel to watch and battle stations, and to specific maintenance, support, and administrative tasks under varying conditions of ship's configuration, computed workload, required operational capabilities, and specified operating profile. This level of manning is termed "organizational manning" and is derived by the design work study process required by OPNAVINSTs 5300.3 and 9330.6.

During full scale development, the requirements for the ships manpower document are updated. Operational evaluation (OPEVAL) personnel required for testing and evaluation of systems and equipment are identified. Additionally, instructor requirements will be identified and coordinated with the Navy training plan (NTP).

A crew phasing and scheduling plan is also developed during full scale development. This is important for scheduling arrival of training personnel, particularly where a long training pipeline exists. For complex systems with many ratings requirements, this

effort is crucial to the availability of trained operators and maintainers of systems and equipment.

Manpower and personnel requirements to support peacetime readiness and wartime employment are identified. The impact of the failure to obtain required personnel on system readiness is evaluated, and available options are identified. This is part of the early fielding analysis (Task 402) in the LSA process. Plans for evaluating manpower and personnel requirements during follow-on test and evaluation are developed.

During production/deployment the requirements for the ships manpower document are updated based on the results of the technical evaluation (TECHEVAL) and OPEVAL. The crew phasing and scheduling plan is also updated based on TECHEVAL and OPEVAL. All manpower and personnel actions must be verified by SEA-05L1.

Supply Support

LSARs: H, H1

Output Reports: 005, 008, 009, 010, 019, 025, 026, 029, 030, 031, 032, 036, 041, 042, 043, 061, 080 106, 150, 151, 152,

Based on the maintenance plan, the supply support required for the new system or equipment will be developed. During the early phases interim supply support will be planned for, if it is required. A representative from the Ships Parts Control Center (SPCC) will be assigned to the ILS management team. This representative acts as point of contact for the overall provisioning process, including receiving technical data inputs and direction from the provisioning engineering support agent (PESA); developing supply codes, catalog systems, and allowance parts list; producing and distributing the coordinated shipboard allowance lists, and identifying and coordinating procurement of spares and repair parts. Also, a PESA representative will be designated. The PESA validates technical data provided by the manufacturer and applies technical coding, such as source, maintenance, and recoverability (SM&R) codes to specific parts.

During full scale development program support data (PSD) sheets will be submitted to SPCC. These data sheets identify the equipment or major components for which support will be required and are used by SPCC for budgeting purposes. Part II of the LSAR Data Selection Sheet (DD 1949-1) will be completed and invoked in the full scale development contract to indicate the Government's maintenance and supply support data requirements from the H and H1 LSARs. The LSAR Data Selection Sheet specifies the required provisioning lists (and data element requirements on each list) to be delivered by the contractor. The LSAR Data Selection Sheet also provides the form (i.e., hard copy or magnetic tape) of data lists to be submitted by the contractor. MIL-STD-1561B, Uniform DOD Provisioning Requirements, serves as a companion document to MIL-STD-1388-2A, DOD Requirements for a Logistics Support Analysis Record. Previously, acquisition contracts in general, have not relied on the LSAR data as the basis for provisioning; rather, a Provisioning Requirements Statement (PRS) was developed by SEA 90521 to invoke in contracts to describe the Government's requirements for provisioning data. In order to accomplish provisioning actions using LSA data, the SEA 90521 LSA PRS will be used for contractual purposes and provisioning technical documentation development. Also during full scale development, a line item is invoked in the contract for interim spares and installation and check-out spares.

During production, provisioning technical documentation (PTD) is prepared by the contractor, provisioning is completed, and allowance parts lists are available. A transition plan is completed to make the transition from interim support to full Navy support, occurring at Navy Support Date.

Support and Test Equipment

LSARs: C, D, D1, E, E1

Output Reports: 005, 007, 013, 019, 036

Support and test equipment (S&TE) requirements are identified early in the acquisition process. S&TE includes associated multi-use end items, ground handling and maintenance equipment, tools,

metrology and calibration equipment, test equipment and automatic test equipment (ATE). Also included under this element is the acquisition of logistic support for the S&TE itself.

The LSA provides a comprehensive identification of support and test equipment requirements at all levels of repair. During program initiation, usable existing equipment must be identified so that development of peculiar equipment is held to a minimum. A major constraint on support and test equipment requirements is the standardization program required by MIL-STD-680. A primary data source in the determination of equipment needs is the task analysis (Task 401), which also defines the skill levels necessary to operate and maintain the equipment. Support and test equipment data resulting from the LSA and recorded in the LSAR include complete equipment identification; maintenance level at which required; quantity of equipment required per organization per operating location; equipment function and capability; calibration requirements; and spares and repair parts lists.

Technical Data

LSARs: A, B, B1, B2, C, D, D1, E, E1, G, H, H1

Output Reports: 004, 015, 016, 017, 020, 028, 029, 030, 031 040, 041, 042, 043, 055, 108,

Technical data are manuals and other forms of documentation containing a description of systems or equipment with instructions for operations and maintenance. All NAVSEA-cognizant ships, systems, and equipment will be supported by up-to-date technical manuals (TMs). They will normally include operational instructions, maintenance instructions, parts lists or parts breakdowns, and related technical information or procedures exclusive of administrative procedures. Technical manuals can be either prepared to meet military specifications, or can be commercially available manuals that meet Navy requirements. They must reflect the system or equipment configuration and identification of all actions required to install it, retain it in a serviceable condition, or restore it to service.

The acquisition of technical manuals requires a distinct planning process that must be developed with inputs from the LSA. A technical manual management team (TMMT) is established to monitor the technical manual quality assurance program on systems of significant criticality or complexity. The TMMT provides a focal point of management and technical skills and is responsible for the coordination of the publications management effort.

In defining the technical data concepts, the following requirements should be considered. The technical manuals must:

- Be based on data provided by the LSA or other applicable analyses;
- Reflect the system maintenance plan;
- Accurately depict the configuration of the system;
- Be changed when the system changes; and
- Contain the information necessary for the safe operation, maintenance, and installation of the system.

During the concept exploration and demonstration/validation phases of the acquisition, technical manual concepts are defined in accordance with the the development plans (technical manual plan (TMP) and the technical manual organization plan (TMOP)); schedules and milestones are established; and contractual requirements articulated. In addition to technical manuals, all ships, systems, and equipment will be supported by accurate engineering drawings. Drawings will be in accordance with specifications. All functional block diagrams and sufficient engineering design information should be included to evaluate the basic system. Technical manual contract requirements (TMCR) are obtained at this time. This document brings together a procurement package that contains information necessary to properly develop and produce usable technical manuals, thereby resulting in a clearer statement of requirements (e.g., CDRLs, DIDs, etc.).

The technical publications developed during full scale development and distributed to users during production/deployment document

he procedures for hardware use and maintenance by system operators nd maintainers. Successful development of these manuals requires n accurate representation of the configuration baseline, validation nd verification of the draft publications, development of preliminary technical repair standards, and reproduction and distribution f final publications with the equipment. Final technical manuals hould provide operator, repair, installation, maintenance, and raining personnel with the data necessary for safe operation and aintenance of a weapon system.

raining and Training Devices

SARs: C, D, D1, E

utput Reports: 001, 002, 003, 004, 005, 006, 007, 008, 009, 010, 011, 012, 013, 014, 015

Identification of training resource requirements, such as billets, equipment, devices, spares, factory training, technical manuals, military construction, site preparation, printed materials for school use, and training aids is the responsibility of NAVSEA program or project managers. Programming and budgeting actions are coordinated by SEA-05L1, which must receive notification of all initial training requirements five years in advance from the program or project office.

During concept exploration, training and training device constraints on system supportability are identified, as well as training cost targets for improvement. Cost and training effectiveness analysis (CTEA) implications of alternative operational and support concepts are evaluated, and an equipment facility requirements (EFR) preliminary site survey (Phase I) is conducted.

Tradeoff studies are performed during demonstration/validation. This is done in order to optimize the balance among hardware characteristics, training concepts, and training resource requirements. Tradeoffs are a key element of the military manpower versus hardware procurement (HARDMAN) methodology, chartered by the Chief of Naval Operations (CNO), for determining training requirements early in the acquisition process.

Development of the Navy training plan (NTP) commences during the monstration/validation phase. Personnel and training plan quirements are developed for input into the support plan. These quirements include criteria for contractor development of proposed rsonnel and training programs during contract definition. They y also include, but are not limited to criteria necessary for arification of project manning policies and priorities; determi- tion of, and justification for, personnel needs (including structors); means to utilize existing personnel and training sources; new training courses required by type, location, and me; training material preparation; and training equipment design, ocurement, fabrication, use, and support. The NTP is updated ring full scale development and production/deployment based on the sults of OPEVAL. A NTP conference is convened by OPNAV upon commendation by the logistic element manager (LEM) and project nager 60 days after the full scale development contract has been gned. The NTP generally is incorporated as the training portion the ILS plan.

Based on the personnel requirements contained in the NTP, a aining package is prepared to record operations and maintenance rsonnel tasks; correlate those tasks to manpower specialty class- fications; establish personnel learning levels and performance andards; define cross-training requirements; and identify the aining courses, aids, and equipment needed to support the new stem or equipment. This information is available from the LSA ask 401). The training curriculum is developed in time to support EVAL.

Factory training will be provided to OPEVAL personnel during ll scale development. It must be funded early to ensure the ailability of qualified user personnel. An interim training pport plan will be developed to provide for training by factory presentatives until Navy personnel have been trained and can

ume responsibility for further training. Procedures for transring training equipment from interim support arrangements to the y logistic support system will be delineated in a technical ining equipment transfer plan.

An equipment facility requirements (EFR) site survey and stallation (Phase II) are accomplished late during full scale velopment. The transfer plan (Phase III) is executed during oduction and deployment, after which formal Navy school training begin.

puter Resources Support

ARs: C, D, E, E1

tput Reports: None

Early in the acquisition process computer hardware and software rformance requirements are determined. Tactical development standards (TADSTANDS) are evaluated and waived if either technically not asible or economically not practicable. A software life cycle nagement plan is developed to describe how software changes for e system will be managed throughout its life cycle and to identify sponsibilities and actions for configuration control, documentaon development, validation and verification, and Fleet feedback.

A software development plan is prepared by the contractor deribing the contractor's quality assurance, configuration managent, program resources, development methodology, personnel and uipments, system integration, and test provisions. Separate qualy assurance, configuration management, and test plans are then veloped. The quality assurance plan addresses tools, techniques, d methodologies; computer program designs, certifications, and cumentation; library controls; reviews, audits, configuration nagement and testing. The configuration management plan estabshes and implements the disciplines of configuration management in e development, testing, and updating of software. The test plan cludes a detailed description of how software will be adequately

:ed to satisfy functional performance requirements and how it
: fulfill operational requirements. A computer program test
:ification is also produced that defines the computer program
ponent, integration, and system test requirements. Finally, test
:edures are developed describing step-by-step test procedures
iired at each testing level.

During full scale development the following documents are pro-
ed: interface design specification, program performance specifi-
ion, program design specification, program description document,
gram data base design document, and the program package
ument. A test report is also prepared defining how testing was
formed and describing test results. The computer program
uments are updated to reflect production configuration.

ilities

Rs: C, D, D1, F

put Reports: 012

A facility is a separate, individual building, structure or
er form of real property, including land, that is subject to
arate reporting under the Department of Defense Property Inven-
y. The facility includes all equipment to support new system or
ipment requirements. The two major categories of facilities are
Class I and II: land, buildings, structures, and plant property;
(2) Class III and IV: plant equipment.

The first step in the facilities planning process is the estab-
hment of a requirement. Is a facility really needed and if so,
t kind, size, and how is it to be outfitted? These questions
t be answered at the outset even if only in a conceptual form.
cific facilities requirements cannot be determined during concept
loration. However, general facilities requirements are developed
complement maintenance planning, supply support, personnel and
ining concepts and installation. Once the general facilities
uirements are formulated, the facilities manager should: (1)
ntify tasking required for tradeoff studies to determine the most

cost-effective solution to meet the facilities requirements; and (2) establish a preliminary plan of action and milestones to meet the stringent time restrictions for military construction (MILCON) planning, programming, budgeting and execution. MILCON funds are required if land, buildings, structures, or a utility estimated to cost in excess of $200,000 is to be purchased. This is done in accordance with NAVFACINST 11010.44D and NAVFACINST 11010.32F. A planning tool used in determining most industrial facilities requirements for the Naval shipyards is referred to as the industrial planning system (IPS). This is a computer oriented system that converts long range workload into the resource requirements of Naval Activities in terms of space, manpower, and shop equipment.

Identification of basic facilities requirements (BFR) will be directed by the LSA. The LSA identifies facilities required to support the weapon system acquisition throughout testing, training, operations, and maintenance. Facilities data resulting from the LSA include identification and description of facilities requirements, design criteria, costs, and lead times.

During the demonstration/validation phase of the system acquisition, facility projects are identified, supporting documentation is prepared, and the support facility plan, site surveys, and site evaluation reports are prepared. Facility requirements can be solidified as the system design is refined.

The actions taken during full scale development include program reviews to identify changes impacting facilities; liaison with property holders to determine workload requirements and to obtain site approval; and consolidation of the support facility plan as the basic technical reference concerning facilities project planning and implementation; development of construction and equipment installation plans; and award of the construction contract(s).

Following the Milestone III decision to proceed with production of the system or equipment, the facilities are constructed, operated and maintained. These facilities may be maintenance, operation,

testing or training facilities. Constant testing is performed to verify that the facility is operational and prepared to perform its intended function throughout the system life cycle.

Packaging, Handling, Storage and Transportation (PHS&T)

LSARs: H, H1, J

Output Reports: 025, 026, 040

The purpose of PHS&T is to properly support the introduction of the new system or equipment into the Fleet. This is accomplished by ensuring the establishment of an effective line of communication to determine that the design constraints documented in the LSAR are evaluated, and all factors involving PHS&T management have been considered for all phases of life cycle support. The PHS&T program incorporates information derived from the LSA. LSA information is used to identify basic packaging design criteria for repair parts and tradeoff analyses should be performed to optimize the PHS&T requirements planning.

There are five different subelements contained in the PHS&T ILS element. Packaging is the act of preparing goods for physical distribution; and the processes and procedures held to protect material from deterioration or damage during shipment and storage. It includes cleaning, drying, preserving, packing, marking, and unitizing. Handling connotes every operation that picks up, sets down, or moves the end product a short distance. Storage is a term limited to the warehousing function ashore. Stowage means items are secured somewhere in a ship. Transportation is the physical distribution of the system or equipment by land, air or water.

During the concept exploration and demonstration/validation phases of the acquisition, PHS&T initial requirements are identified and refined, and special handling devices and procedures are developed and finalized in time for first item delivery. A logistic flow chart is developed depicting logistic support material movement from originator to its intended destination. It will facilitate an overall systems engineering approach to development of PHS&T requirements.

The full scale development phase is the time to finalize all PHS&T requirements. As the system design is refined and finalized, a PHS&T plan is developed ensuring that requirements are integrated with the system design and support program. Flow charts are updated and a delivery schedule is developed. This schedule is based upon predicted system requirements in the Fleet. The schedule will provide planning for implementation of contract production and deployment.

As part of the production contract, PHS&T finalized requirements are identified during the production/deployment phase. This is to ensure that prime items and parts will arrive at their destinations in a condition suitable for use. PHS&T delivery schedules will be updated to reflect changes made to the equipment or component delivery schedules.

Design Interface

LSARs: A, B, B1

Output Reports: 051

Design interface is the element concerned with the relationship between logistic-related design parameters, such as reliability and maintainability, and readiness and resource requirements. These logistic-related design parameters are expressed in operational terms rather than as inherent values, and specifically relate to system readiness objectives and support costs of the material system.

The reliability program, performed in accordance with MIL-STD-785, provides the following types of input data to the LSA: reliability apportionment/predictions; the effects of storage, shelf life, packaging, transportation, handling and maintenance on reliability; failure mode, effects and criticality analysis (FMECA) data; and preferred parts list. These data interface with and are impacted by the standardization, PHS&T and system safety programs. A major task is the FMECA, which is used for timely identification of predicted system or equipment failures and the effects of these

failures on the total system. FMECA (performed as part of Task 301) is a continuing effort affecting the system and equipment design and the logistic support system. Examples of FMECA data inputs to the LSA are item failure modes; failure rates; failure symptoms; failure criticality; failure effects; and detection methods.

The maintainability program, conducted in accordance with MIL-STD-470, provides detailed qualitative and quantitative maintainability requirements and maintenance plan details as inputs to the LSA. Maintainability task analysis data, predicted parameters, design guidelines and demonstration results are included.

Maintainability predictions provide system and equipment maintainability parameters used in estimating system maintainability values associated with hardware indenture levels. Initially, quantification may be limited by uncertainty of design and scarcity of data. Best estimates will be used in conjunction with LSA data pertaining to repair levels, logistic support resources and optimized support characteristics. During full scale development, prediction techniques will provide quantitative estimates of maintainability parameters for use in identifying design features requiring corrective action and in determining logistic support requirements. Examples of maintainability predictions that are inputs to LSA include mean time to repair; mean downtime; and maintenance manhours per operational increment.

A repetitive maintainability analysis provides data used in defining the resources required for maintaining the system or equipment. Specific analysis outputs include: the delineation, by maintenance level, of specific maintenance tasks necessary to sustain the equipment in, or return it to, operating condition; task times and frequencies; personnel requirements (skill levels and quantities); training and training equipment requirements; support and test equipment, spares, repair parts, and consumables; and facility requirements. As in many areas of LSA the task analysis is iterative, performed in greater detail as the design is defined. Maintenance times and personnel requirements are estimated in

the concept exploration phase and defined in detail as the design progresses through the full scale development phase. The FMECA is the primary source of data for identification of corrective and preventive maintenance tasks (Task 301). When detailed design data are available, tasks are organized into step-by-step procedures that are used as the basis for technical data preparation. Examples of task analysis (Task 401) detailed inputs to LSA are task descriptions; sequential actions comprising a task; task frequencies; man-hours per task; personnel requirements per task; replacement parts per task; and support and test equipment per task.

APPENDIX A

ACRONYMS

AAL	Additional Authorization List
ADP	Automated Data Processing
AFP	Approval for Full Production
ATE	Automatic Test Equipment
BFR	Basic Facility Requirements
BII	Basic Issue Items
CBIL	Common Bulk Items List
CDRL	Contract Data Requirement List
CFE	Contractor Furnished Equipment
CNO	Chief of Naval Operations
COEI	Component of End Item
CSEL	Consolidated Support Equipment List
CTEA	Cost and Training Effectiveness Analysis
DCN	Design Change Notice
DID	Data Item Description
DFS	Direct Fleet Support
DLR	Depot Level Repairable
DLSC	Defense Logistics Services Center
DOP	Designated Overhaul Point
DSARC	Defense Systems Acquisition Review Council
EFR	Equipment Facility Requirements
ESML	Expendable/Durable Supplies and Materials List
ESWBS	Expanded Ship Work Breakdown Structure
FAT	First Article Test
FGC	Functional Group Code
FMECA	Failure Modes, Effects and Criticality Analysis
FOMIS	Fitting Out Management Information System
GFE	Government Furnished Equipment
HARDMAN	Hardware-Manpower
IAW	In Accordance With
IEM	Inactive Equipment Maintenance
ILS	Integrated Logistic Support
IMA	Intermediate Maintenance Activity
IPS	Industrial Planning System
ISEA	In-Service Engineering Agent
JMSNS	Justification for Major System New Start
LAPL	Lead Allowance Parts List
LCN	Logistic Support Analysis Control Number
LEM	Logistic Element Manager

LLIL	Long Lead Items List
LORA	Level of Repair Analysis
LSA	Logistic Support Analysis
LSAR	Logistic Support Analysis Record
MAC	Maintenance Allocation Chart
MILCON	Military Construction
MIL-STD	Military Standard
MOTU	Mobile Technical Units
NA	Not Applicable
NATO	North Atlantic Treaty Organization
NAVSEA	Naval Sea Systems Command
NAVSEAINST	Naval Sea Systems Command Instruction
NAVFACINST	Naval Facilities Engineering Command Instruction
NAVMAT	Naval Material Command
NTP	Navy Training Plan
OPEVAL	Operational Evaluation
OPNAV	Office of the Chief of Naval Operations
OR	Operational Requirement
PCL	Post Conference List
PESA	Provisioning Engineering Support Agent
PHS&T	Packaging, Handling, Storage and Transportation
PLISN	Provisioning List Item Sequence Number
PMAC	Preliminary Maintenance Allocation Chart
PMS	Planned Maintenance System
PPL	Provisioning Parts List
PRS	Provisioning Requirements Statement
PSD	Program Support Data
PSMD	Preliminary Ship Manning Document
PTD	Provisioning Technical Documentation
R&M	Reliability and Maintainability
RCM	Reliability-Centered Maintenance
RPSTL	Repair Parts and Special Tools List
S&L	Servicing and Lubrication
SCPL	System Configuration Provisioning List
SFPPL	Short Form Provisioning Parts List
SLC	Skill Level Code
SLPPL	Ship Level Provisioning Parts List
SM&R	Source, Maintenance and Recoverability
SOW	Statement of Work
SPCC	Ships Parts Control Center, Mechaniscsburg, PA (Navy)
SSC	Skill Specialty Code
S&TE	Support and Test Equipment
TADSTANDS	Tactical Development Standards
TBD	To Be Determined
TECHEVAL	Technical Evaluation
TDBD	Top-Down Breakdown
TLR	Top Level Requirement

TM	Technical Manual
TMCR	Technical Manual Contract Requirement
TMMT	Technical Manual Management Team
TMOP	Technical Manual Organization Plan
TMP	Technical Manual Plan
TTEL	Tools and Test Equipment List
UUT	Unit Under Test
VAMOSC	Visibility and Management of Operating and Support Cost

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